1. A gas turbine power system for producing electricity, comprising

a compressor for compressing a first medium,

an electrochemical converter in fluid communication with the compressor and being adapted to receive the first medium and a second medium, the converter being configured to allow electrochemical reaction between the first and second mediums and to produce exhaust having a selected elevated temperature, and

a turbine in fluid communication with the electrochemical converter and adapted to receive the converter exhaust,

wherein the turbine converts the electrochemical converter exhaust into rotary energy.

2. The gas turbine power system of claim 1 further comprising a generator associated with the turbine and adapted to receive the rotary energy thereof, wherein the generator produces electricity in response to the turbine rotary energy.

3. The gas turbine power system of claim 1 wherein the electrochemical converter is adapted to produce electricity.

4. The gas turbine power system of claim 1 wherein the electrochemical converter is adapted to operate at an elevated temperature and at atmospheric pressure, and wherein said power system further comprises heat exchanger means in thermal association with the electrochemical converter for extracting waste heat from the converter exhaust and for transferring the waste heat to the turbine.

5. The gas turbine power system of claim 1 wherein the electrochemical converter has a selected operating temperature and is adapted to operate at an elevated temperature and at an elevated pressure, wherein the electrochemical converter includes internal medium heating means for internally heating the first and second mediums to the converter operating temperature.

6. The gas turbine power system of claim 5 wherein the electrochemical converter comprises a plurality of tubular converter elements which include a circular electrolyte layer having an oxidizer electrode material on one side and a fuel electrode material on the opposing side.

7. The gas turbine power system of claim 1 wherein the turbine is adapted to receive directly the exhaust of the electrochemical converter.

8. The gas turbine power system of claim 1 wherein the electrochemical converter comprises

an electrochemical converter assembly having a plurality of stacked converter elements which include

a plurality of electrolyte plates having an oxidizer electrode material on one side and a fuel electrode material on the opposing side, and

a plurality of interconnector plates for providing electrical contact with the electrolyte plates, wherein the stack of converter elements is assembled by alternately stacking interconnector plates with the electrolyte plate.

9. The gas turbine power system of claim 8 wherein the stacked converter elements further include

a plurality of manifolds axially associated with the stack and adapted to receive the first and second mediums, and

medium heating means associated with the manifold for heating at least a portion of the first and second mediums to the operating temperature of the converter.

10. The gas turbine power system of claim 9 wherein the interconnector plate comprises a thermally conductive connector plate.

11. The gas turbine power system of claim 9 wherein the medium heating means comprises a thermally conductive and integrally formed extended surface of the interconnector plate that protrudes into the axial manifolds.

12. The gas turbine power system of claim 9 wherein the stack of converter elements further comprises a plurality of spacer plates interposed between the electrolyte plates and the interconnector plates.

13. The gas turbine power system of claim 12 wherein the medium heating means comprises a thermally conductive and integrally formed extended surface of the spacer plate that protrudes into the plurality of axial manifolds.

14. The gas turbine power system of claim 9 wherein the electrochemical converter assembly generates waste heat which heats the first and second mediums to the converter operating temperature, the waste heat being conductively transferred to the first and second mediums by the interconnector plate.

15. The gas turbine power system of claim 1 wherein the operating temperature of the electrochemical converter assembly is between about 20°C and about 1500°C.

16. The gas turbine power system of claim 1 wherein said electrochemical converter is a fuel cell selected from the group consisting of a solid oxide fuel cell, molten carbonate fuel cell, phosphoric acid fuel cell, alkaline fuel cell, and proton exchange membrane fuel cell.

17. The gas turbine power system of claim 1 further comprising preheating means for preheating the first and second mediums prior to introduction to the electrochemical converter.

18. The gas turbine power system of claim 17 wherein the preheating means comprises one of an external regenerative heat exchanger and a radiative heat exchanger.

19. The gas turbine power system of claim 17 wherein at least the preheating means disassociates the first and second mediums, which includes hydrocarbons and reforming agents, into non-complex reaction species.

20. The gas turbine power system of claim 9 wherein at least the medium heating means disassociates the first and second mediums, which includes hydrocarbons and reforming agents, into non-complex reaction species.

21. The gas turbine power system of claim 1 wherein the electrochemical converter is placed serially in-line between the compressor and the turbine.

22. The gas turbine power system of claim 1 further comprising converter exhaust heating means, disposed between the electrochemical converter and the turbine, for heating the exhaust of the converter to a selected elevated temperature prior to introduction to the turbine.

23. The gas turbine power system of claim 22 wherein the converter exhaust heating means comprises a natural gas combustor.

24. The gas turbine power system of claim 1 further comprising regenerative thermal enclosure means forming a pressure vessel about the electrochemical converter.

25. The gas turbine power system of claim 1 wherein the first medium includes air and the second medium includes natural gas.

26. The gas turbine power system of claim 1 further comprising a steam generator associated with the gas turbine and adapted to receive the gas turbine exhaust, the steam generator convectively coupling the exhaust of the gas turbine to a working medium.

27. The gas turbine power system of claim 26 further comprising a steam turbine associated with the steam generator and configured for producing electricity.

28. A power generating system comprising

an electrochemical converter assembly having a plurality of stacked converter elements and being adapted to receive one or more reactants, and

a gas turbine having a compressor and being associated with the electrochemical converter, the compressor being adapted to preheat the reactants.

29. The power generating system of claim 28 further comprising a generator associated with the gas turbine, wherein the turbine produces rotary energy and the generator produces electricity in response to the turbine rotary energy.

30. A steam turbine power system, comprising

an electrochemical converter for producing exhaust and waste heat having a selected elevated temperature,

a steam generator associated with the electrochemical converter, and

a steam turbine associated with the steam generator and configured for producing electricity.

31. The steam turbine power system of claim 30 wherein the electrochemical converter is adapted to operate at an elevated temperature, and wherein the converter includes heat exchanger means for radiatively exchanging heat between the converter and the steam generator.

32. The steam turbine power system of claim 31 wherein the steam generator includes a working medium, and wherein the exhaust of the electrochemical converter radiatively heats the working medium through the heat exchanger means.

33. The steam turbine power system of claim 30 further comprising a heat recovery heat exchanger adapted to receive the converter exhaust, and wherein the exchanger is associated with the turbine.

34. The steam turbine power system of claim 33 wherein the exchanger convectively transfers waste heat from the converter exhaust to the turbine.

35. The steam turbine power system of claim 30 wherein the electrochemical converter comprises

an electrochemical converter assembly having a plurality of stacked converter elements which include

a plurality of electrolyte plates having an oxidizer electrode material on one side and a fuel electrode material on the opposing side, and

a plurality of interconnector plates for providing electrical contact with the electrolyte plates, wherein the stack of converter elements is assembled by alternately stacking interconnector plates with the electrolyte plate.

36. The steam turbine power system of claim 35 wherein the stacked converter elements further include

a plurality of manifolds axially associated with the stack and adapted to receive reactants, and

reactant heating means associated with the manifold for heating at least a portion of the reactants to the operating temperature of the converter.

37. The steam turbine power system of claim 36 wherein the interconnector plate comprises a thermally conductive connector plate.

38. The steam turbine power system of claim 36 wherein the reactant heating means comprises a thermally conductive and integrally formed extended surface of the interconnector plate that protrudes into the plurality of axial manifolds.

39. The steam turbine power system of claim 36 wherein the stack of converter elements further comprises a plurality of spacer plates interposed between the electrolyte plates and the interconnector plates.

40. The steam turbine power system of claim 39 wherein the reactant heating means comprises a thermally conductive and integrally formed extended surface of the spacer plate that protrudes into the plurality of axial manifolds.

41. The steam turbine power system of claim 36 wherein the electrochemical converter assembly generates waste heat which heats the reactants to the converter operating temperature, the waste heat being conductively transferred to the reactants by the interconnector plate.

42. The steam turbine power system of claim 30 wherein the operating temperature of the electrochemical converter assembly is between about 20°C and about 1500°C.

43. The steam turbine power system of claim 30 wherein the electrochemical converter is a fuel cell selected from the group consisting of a solid oxide fuel cell, molten carbonate fuel cell, phosphoric acid fuel cell, alkaline fuel cell, and proton exchange membrane fuel cell.

44. The steam turbine power system of claim 30 further comprising preheating means for preheating the reactants prior to introduction to the electrochemical converter.

45. The steam turbine power system of claim 44 wherein the preheating means comprises one of an external regenerative heat exchanger and a radiative heat exchanger.

46. The steam turbine power system of claim 44 wherein at least the preheating means disassociates the reactants, which includes hydrocarbons and reforming agents, into non-complex reaction species.

47. The steam turbine power system of claim 36 wherein at least the reactant heating means disassociates the reactants, which includes hydrocarbons and reforming agents, into non-complex reaction species.

48. The steam turbine power system of claim 30 wherein the electrochemical converter is adapted to produce electricity.

49. The steam turbine power system of claim 30 further comprising a gas turbine in fluid communication with the electrochemical converter and adapted to receive the electrochemical converter exhaust and to produce electricity, wherein the gas turbine is in fluid communication with the steam generator and produces exhaust having a selected elevated temperature for subsequent transfer to the steam generator.

50. A power system comprising

an electrochemical converter adapted to receive input reactants and to produce electricity, waste heat and exhaust,

a gas turbine comprising a compressor and a mechanical turbine, the turbine producing electricity and exhaust having a selected elevated temperature,

a steam generator associated with the gas turbine and adapted to receive the gas turbine exhaust, the steam generator convectively coupling the exhaust of the gas turbine to a working medium, and

a steam turbine associated with the steam generator and configured for producing electricity.

51. The power system of claim 50 further comprising heating means associated with the electrochemical converter and the gas turbine for heating the exhaust of the converter to a selected elevated temperature prior to introduction to the gas turbine.

52. The power system of claim 51 wherein the heating means is a natural gas combustor.